



Kochi Municipal Corporation

Preparation of a Mobility Improvement Plan along North-South Railway Station corridor in Kochi

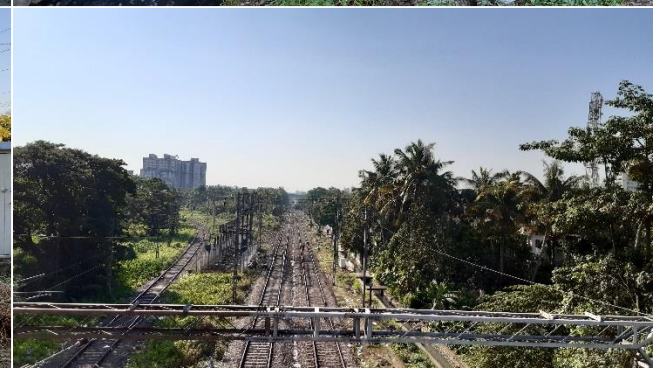
Presentation of Final Report
November 2020



Agenda

1. Reminding the context and objectives of the project
2. Overview of the Mobility Improvement Plan
3. Design of the Green Mobility Corridor
4. Evaluation of the Mobility Improvement Plan
5. Long-term vision
6. Conclusion

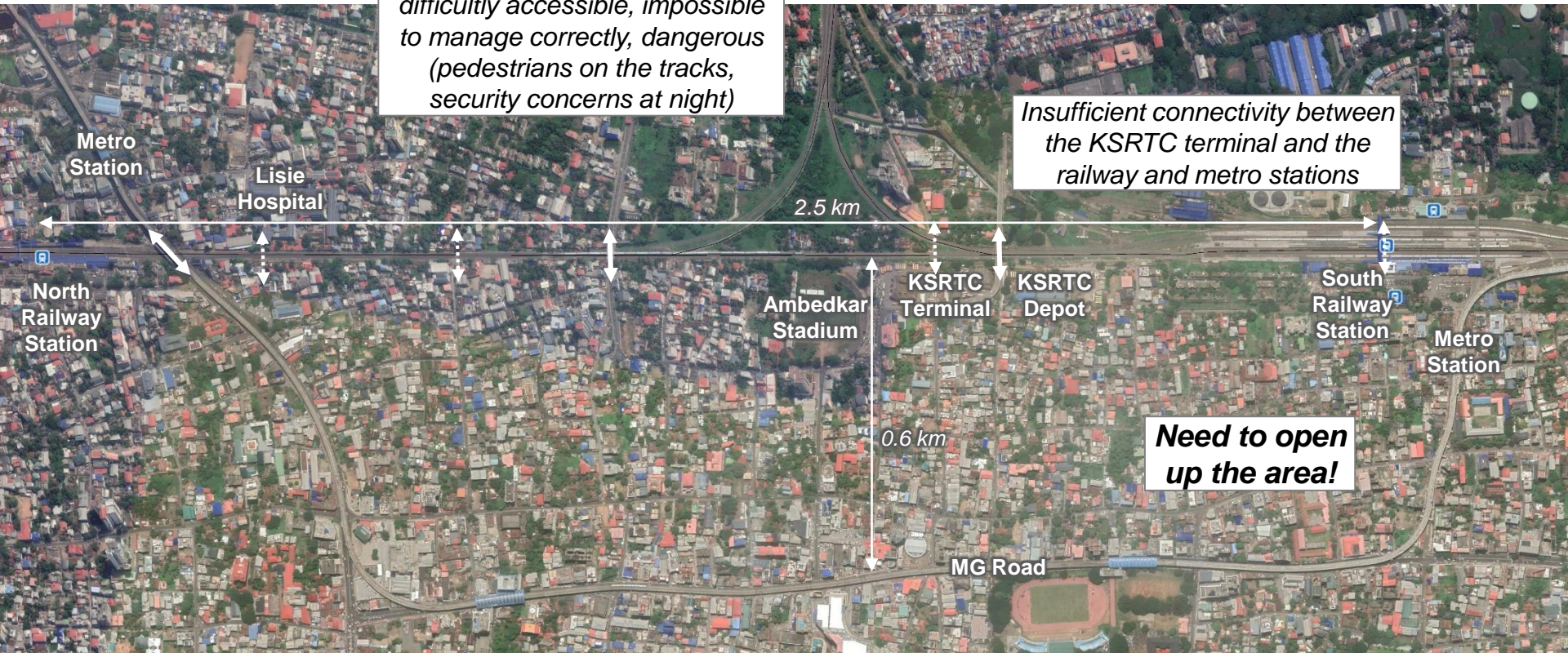
1. Reminding the context and objectives of the project



The corridor

At the heart of the city centre, but difficultly accessible, impossible to manage correctly, dangerous (pedestrians on the tracks, security concerns at night)

Insufficient connectivity between the KSRTC terminal and the railway and metro stations

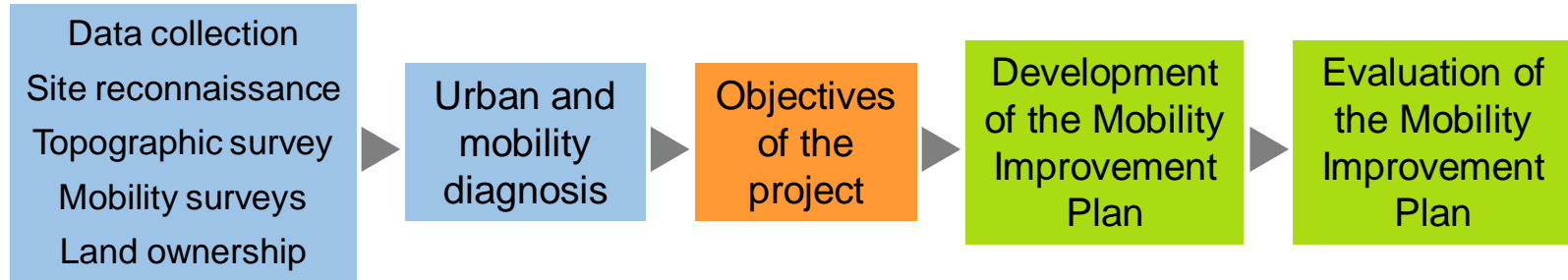


Objectives of the project



1. **Connectivity:** creating or improving links between KSRTC terminal and the railway and metro stations, access to Ambedkar Stadium and Lisie Hospital, connection between both railway stations (incl. for Railways personnel), links with MG Road, less congestion on parallel roads...
2. **Urban management:** improving safety and security for all, cleanliness, better control / surveillance by Authorities, improvement of the drains
3. **Inclusion in the city:** step by step, turning a backyard area into a lively urban space, including social and economic activities

Methodology



2. Overview of the Mobility Improvement Plan

Overview of the Mobility Improvement Plan

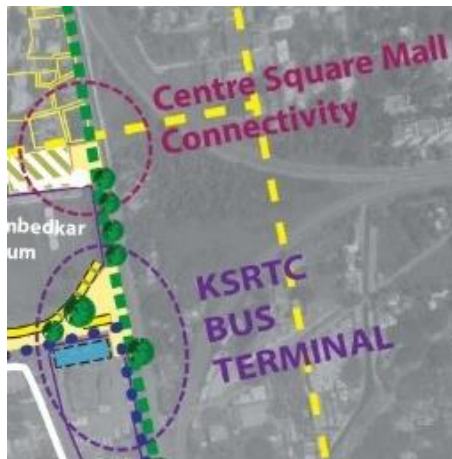
1. Development of a green corridor adapted to non-motorised transportation



2. Development of e-rickshaw services



3. Development of hubs and connections to the city centre



4. Development of social and commercial activities



1. Development of a green corridor adapted to non-motorised transportation (NMT)

- **Already a lot of pedestrians and numerous cyclists along the corridor:** about 6000 pedestrians and 400 cyclists going along the North-South railway corridor every day. But with bad and unsafe conditions, often walking on the railway tracks. There is no continuity, no light. A central goal of the project is to **improve the walking and cycling conditions**.
- Many trips along the corridor are within a **range of distance adapted to NMT**.
- **NMT modes are the most sustainable and affordable of all**, so it is logical to give them priority as part of a Green Mobility corridor project.
- **Along most of the corridor, there is no room for a vehicular road** between the railway and the adjacent properties. Extending the right-of-way on adjacent properties would mean demolishing many buildings and houses, which does not appear desirable nor practical at short or medium terms.
- Developing an NMT facility is also **a way to improve streetscape, connectivity and social activities in the corridor**.



Develop a bicycle-sharing system at the main hubs along the corridor?

2. Development of e-rickshaw services

- Intermediate public transport has **a major role to play in sustainable mobility in urban contexts, on short distances**. Autorickshaws are already highly active along the corridor, with a major hub near the KSRTC bus terminal.
- As part of the Green Mobility corridor project, autorickshaws should **progressively transform into their more sustainable and silent version: e-rickshaws**, as already developed in Kochi as feeder to metro stations.
- A **shuttle service of shared e-rickshaws** would perfectly complement the NMT corridor. They would partly use the same alignment as NMT along the railway, and partly use parallel streets.



LEGEND	
Connectivity between North and South Railways Stations :	
	Non-motorized modes
	Electric rickshaw
	Railway station
	Station platform
	Private Land
	Public Land
	Vacant Land

3. Development of hubs and connections to the city centre

- The project is organised with various “hubs” along the corridor: providing **intermodal connections between transport modes** and **articulating the North-South corridor with East-West connections to the city centre (MG Road)**.
- They are also places where nice **public spaces and social and commercial activities** can be developed.



4. Development of social and commercial activities

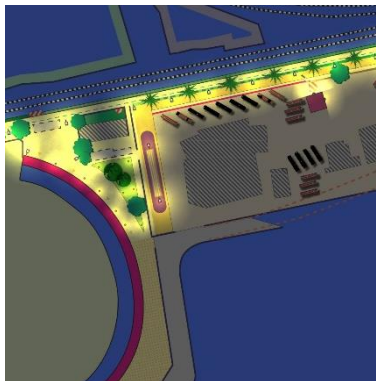
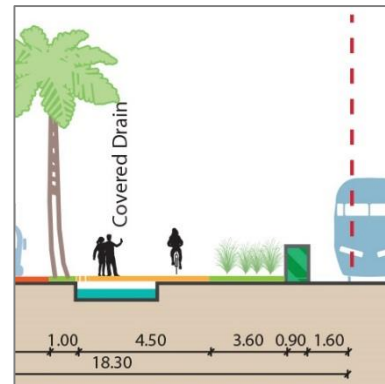
- Small shops selling drinks or lottery tickets can be found along the corridor, mainly at intersections with other roads.
- There are also some social and recreation facilities, play grounds, sport fields.
- The Green Mobility corridor is an **opportunity to consolidate and develop these activities**.
- The existing activities can be:
 - **Sheltered in small wooden constructions**, easily identifiable and similar all along the corridor
 - **Shifted**, whenever necessary, **to more spacious spaces**
 - **Made more visible** by upgrading public spaces in their surroundings.
- Activities under the Ambedkar Stadium stands would be upgraded and developed.



3. Design of the Green Mobility Corridor

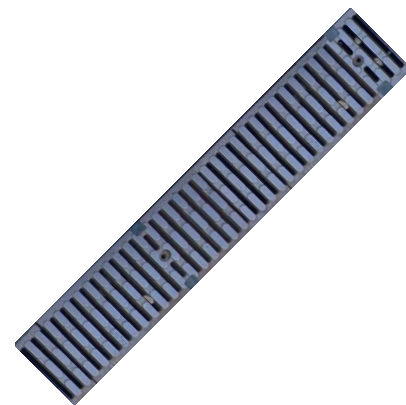
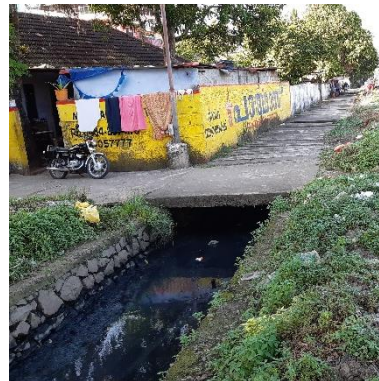
Design principles: functional improvements

- A **pathway of 4.5 m** with some narrow points of 3 m
- A limited range of **surfacing materials**, uniform by mode all along the stretch
- **Levelling the ground** whenever possible. In some places it would be necessary to create low retaining walls on several metres
- **Materialisation of limits:** fences, palisades, hedges, in order to delineate and secure the various spaces. We also recommend the implementation of a fence all along the railway line.
- The **illumination** of the Green Mobility corridor and of its adjacent spaces through an elaborate lighting program. The objective is to improve security and safety, and also to participate in the beautification of the corridor.

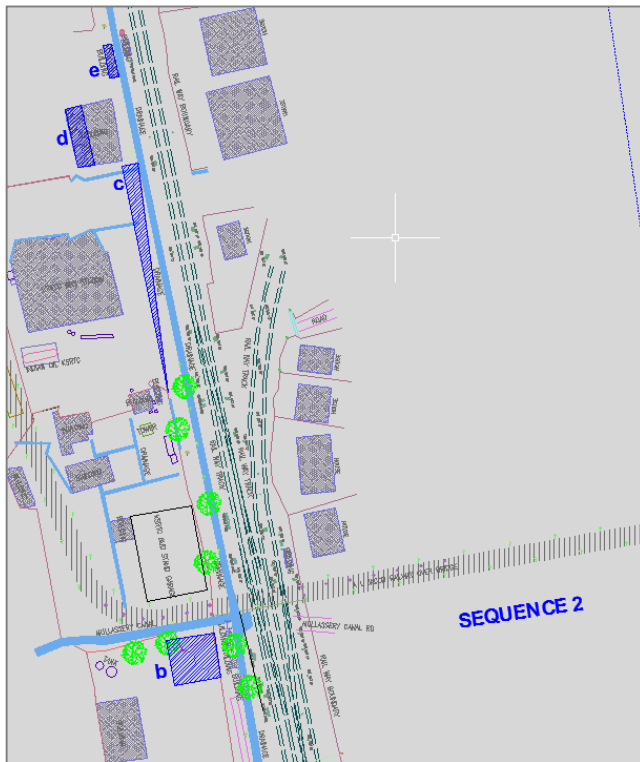
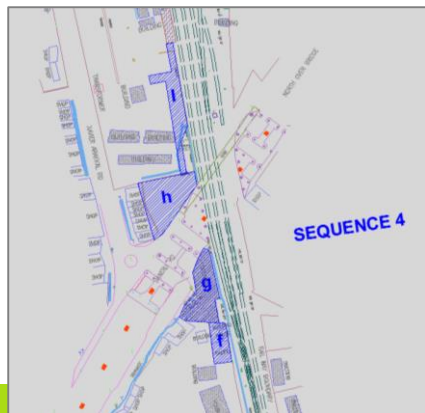
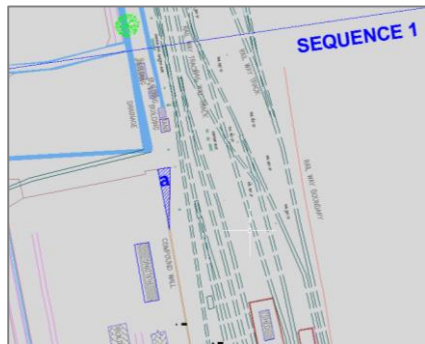


Design principles: drains and railway utilities

- A **large part of the drains is already covered** by concrete slabs, often uneven and discontinuous.
- To create an even and easily practicable pathway for NMT, we propose a **continuous coverage of the drain on the whole corridor**, with integration of channel gratings along the property walls.
- Covered drains will be used only by pedestrians and cyclists, and not by motorized vehicles.
- Various **technical utilities** can be found around the railway line: catenary poles, electric boxes, milestones...
- In some places they are implanted very close to the property walls, narrowing the available right-of-way. **The project is designed as to maintain these utilities**, even if it narrows the passage to 3 m locally.



Design principles: land availability



- The available right-of-way is highly variable.
- **The project is designed with very limited land acquisition**, at least at short term: only local extensions on publicly-owned land and demolition of small buildings.
- A variant in the North railway station area would impact presumably private land and larger buildings.

Design principles: materials

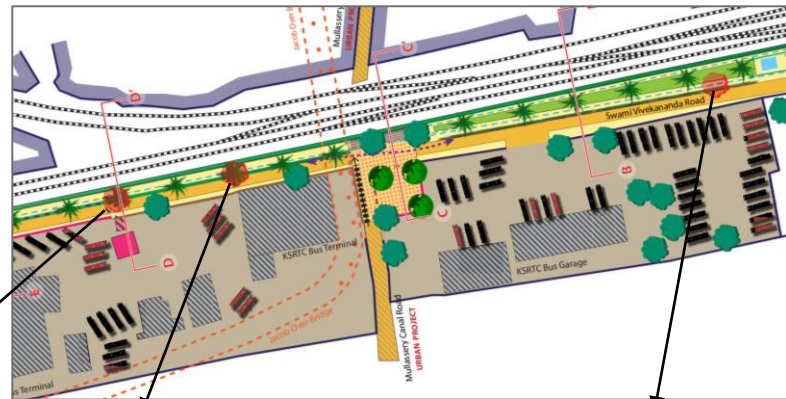
- Deactivated concrete for NMT pathways
- Concrete tiles for trafficable spaces
- Gravel for technical areas
- Wood structures protecting the shops and new services or hiding technical utilities
- Canopy for the rickshaw station
- A range of lighting devices depending on the context (light posts, wall lighting) and CCTV surveillance system





Design principles: plantations and green spaces

- Preserving, valorising and developing the existing vegetation
- Alignment of high-stem trees along road and pathways
- Large span trees for squares and plazas
- Plantation of about 25 trees, proposed suppression of 3 trees obstructing the alignment

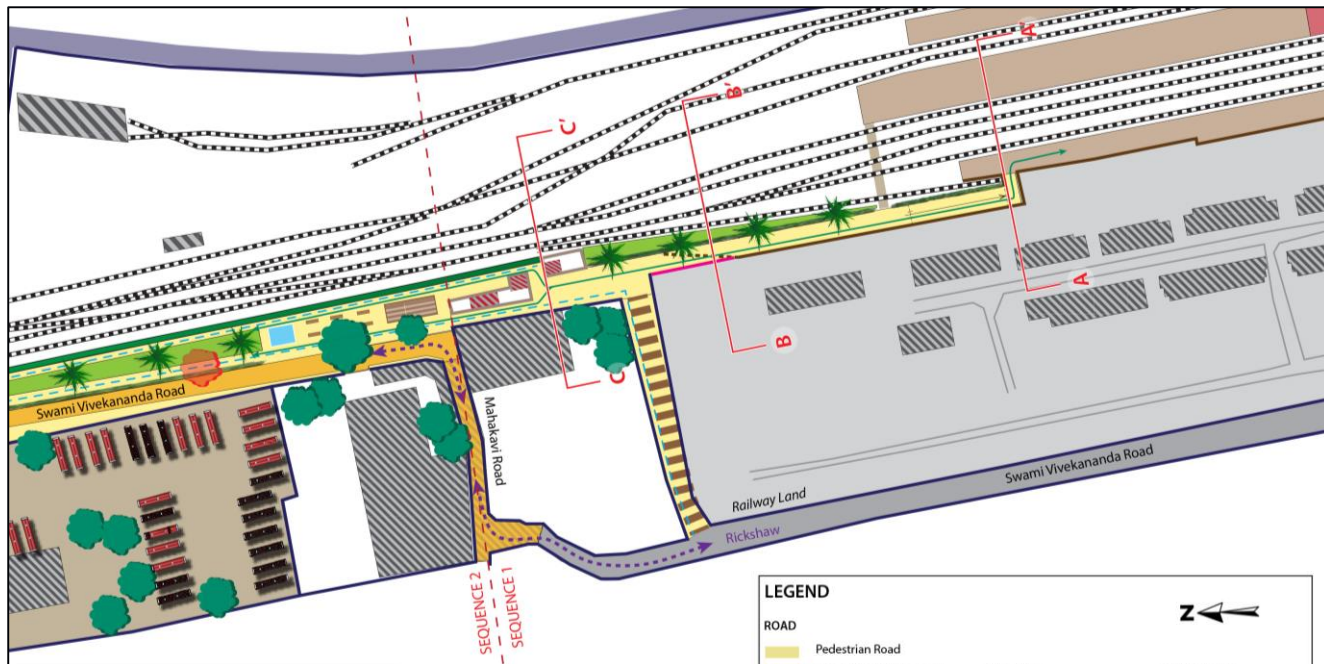


Design principles: safety, security and universal access

- **Security** is one of the main goals of the project:
 - Creating a continuous and secure pathway for active modes, enabling to walk out of the railway tracks
 - Installation of a fence separating the pathway from the railway tracks
- **Safety**: lighting, CCTV, activities
- **Accessibility**: no stairs, ramps with gradients of less than 4%, possibility of tactile strips (crossings, ramps) and tactile lanes (visual-impairment)



South railway station area



LEGEND

ROAD

- Pedestrian Road
- Pedestrian Priority Road
- Existing Paved Road
- New Paved Road
- Bus Garage
- Asphalt Road
- Dirt Road
- Rickshaw
- Motorised Two-wheelers
- Cycle Parking
- Road Over Bridge
- Pedestrian Over Bridge

BUILDING

- Building
- Technical Building
- Trading stall
- Renovated Building
- Shops
- Access to shops
- Wall
- Removed Wall
- New Wall
- Electric Box

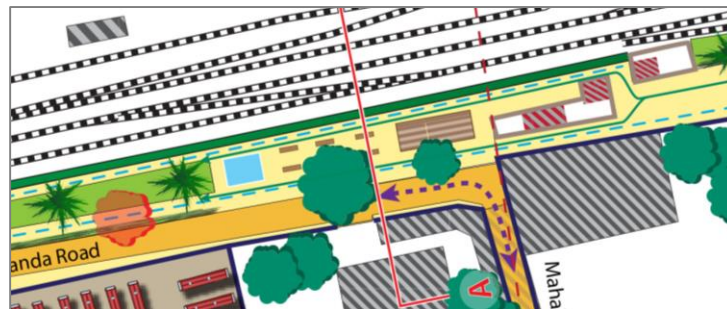
STREETSCAPE

- Partly Obstructive
- Existing trees
- New trees
- Green spaces
- Hedges
- Covered Drain
- Wooden Fence
- Existing Boundary
- Changed Boundary



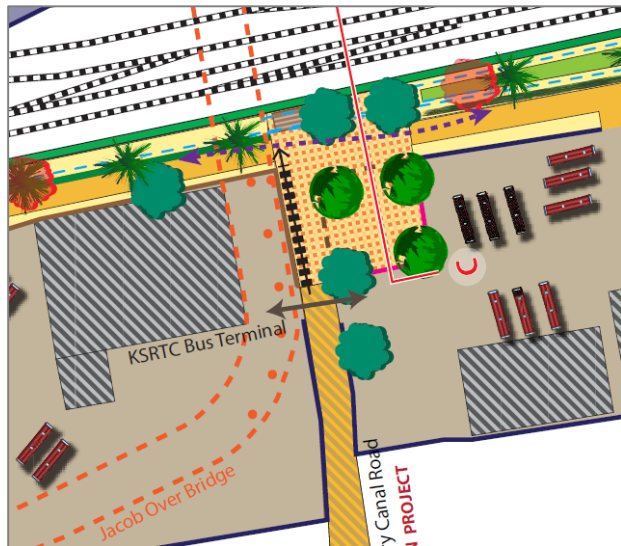


Saint-Joseph school plaza

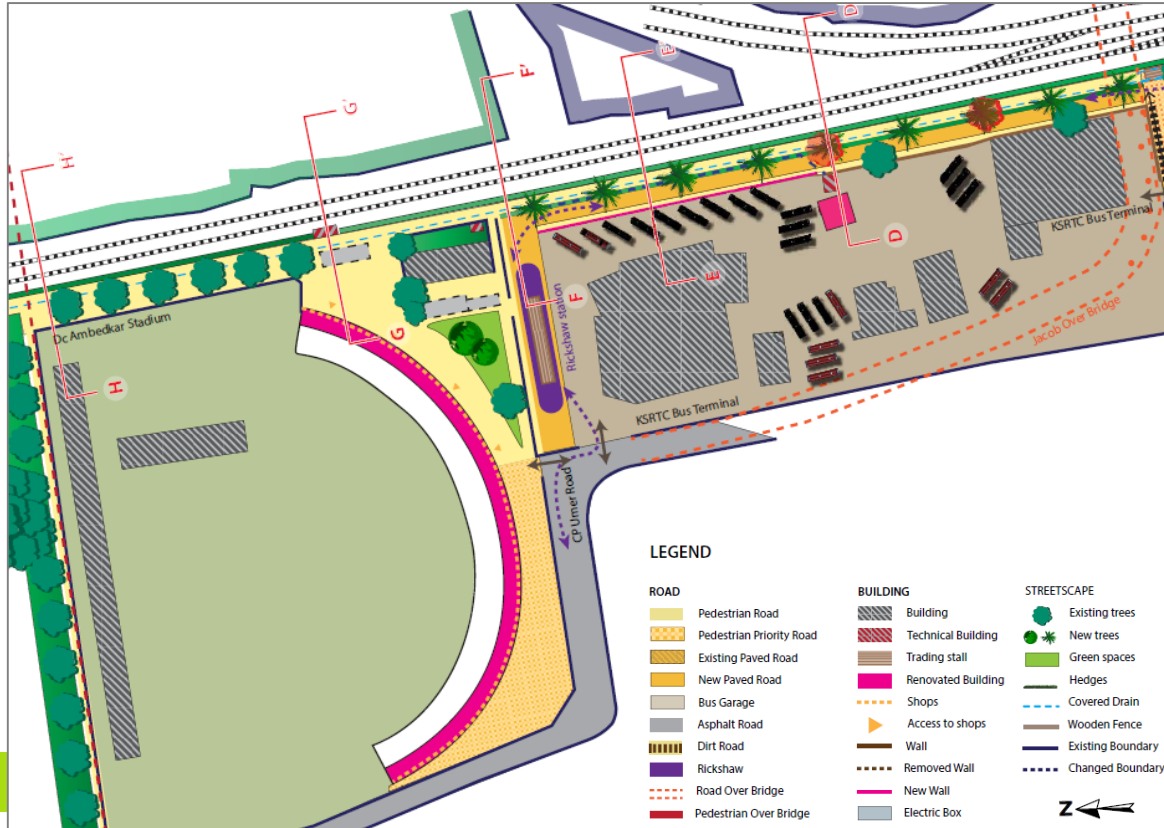


Mullassery Canal Road

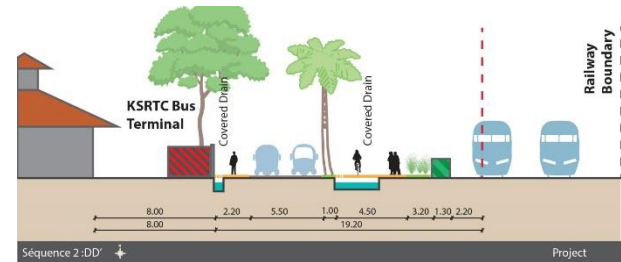
- Creation of a square with extension of public space on KSRTC plot



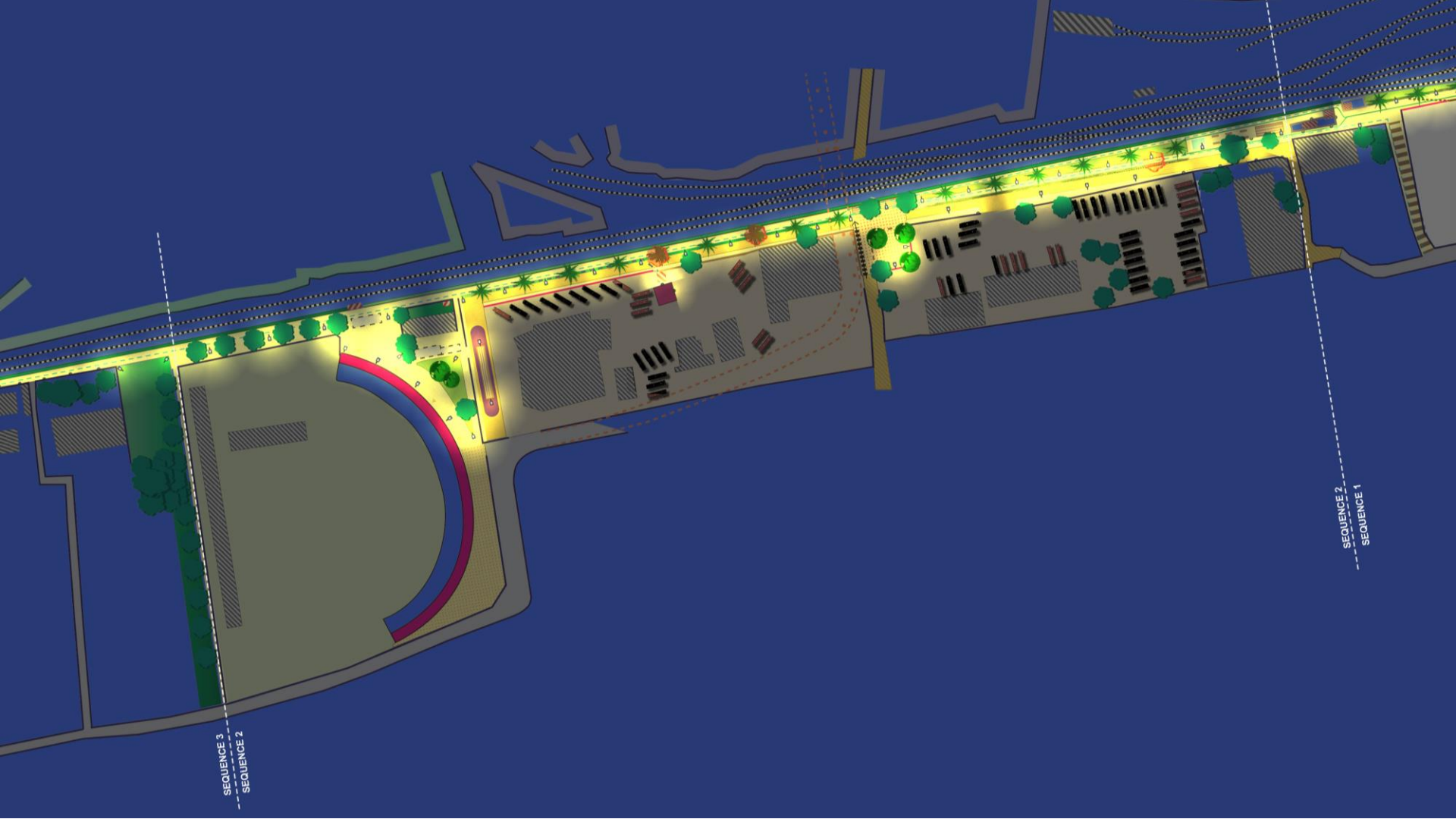
Bus terminal and Stadium area



- Creation of an NMT continuity by covering the drain and demolishing small buildings/structures
- Connecting Swami Vivekananda Road and CP Ummer Road for e-rickshaws only, taking a small land strip of KSRTC bus terminal
- Upgrading the existing autorickshaw station to accommodate e-rickshaws
- Developing activities and public space near the stadium, with upgrade of the stadium stands







SEQUENCE 3
SEQUENCE 2

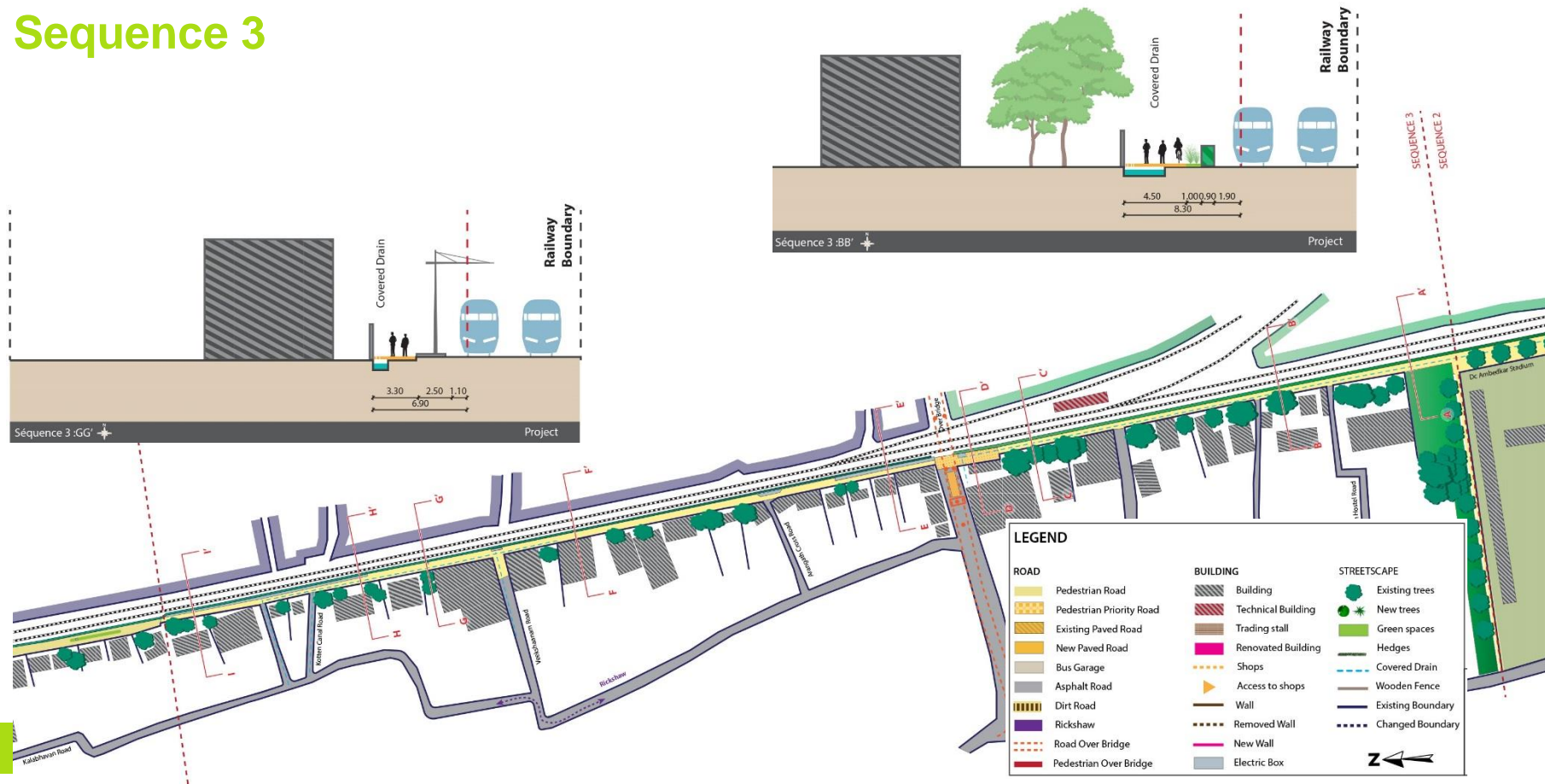
SEQUENCE 2
SEQUENCE 1

“Sequence 3”: the narrow stretch in the middle of the corridor

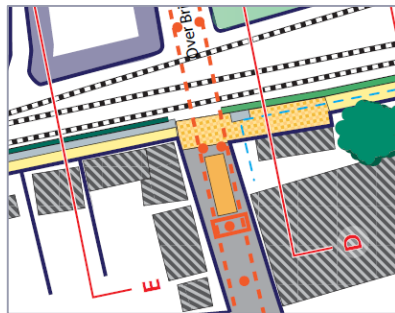


- 640 m
- Mostly residential area
- Many houses / buildings very close to the parcels' limit
- Many railway utilities (electric boxes, catenary poles, milestones)
- Possible pathway of 3 to 4.5 m
- Vehicular access would require building demolitions all along

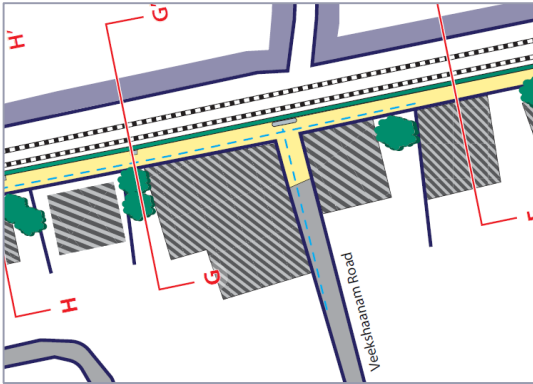
Sequence 3



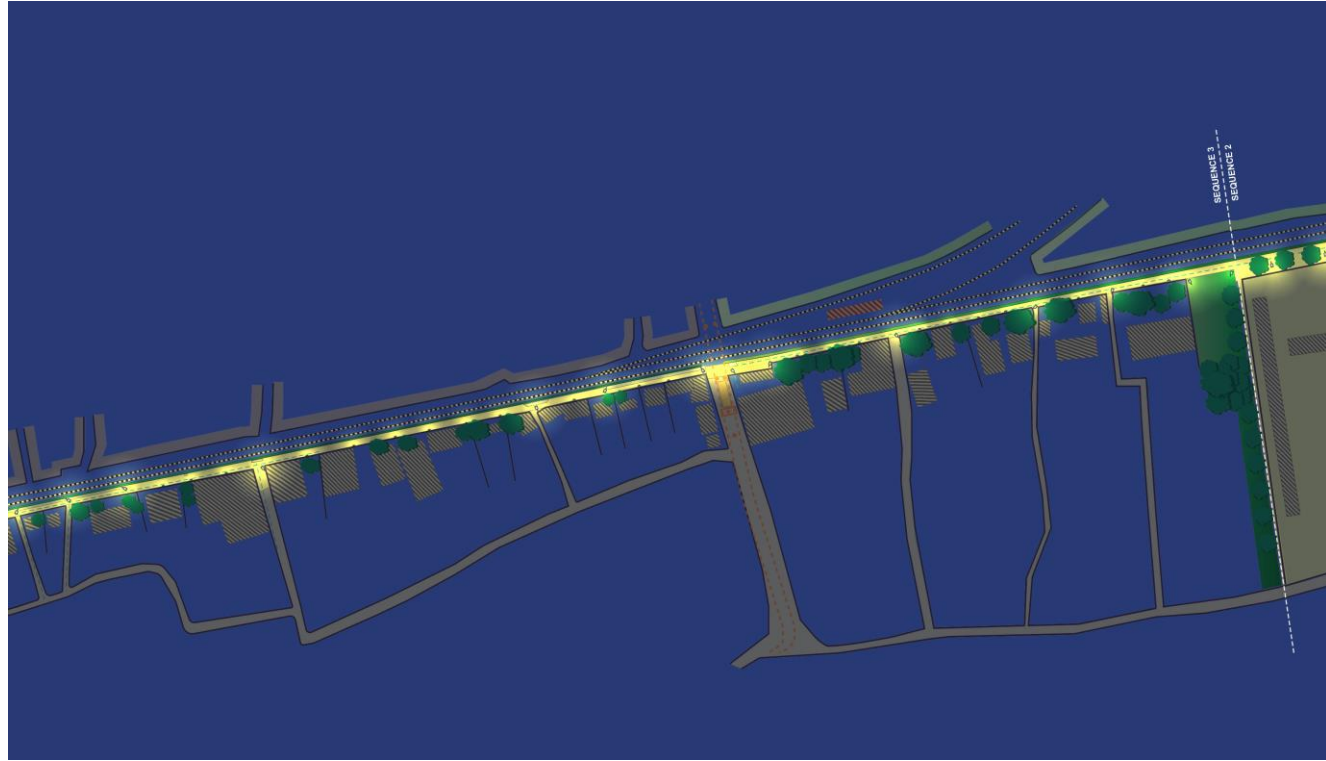
Sequence 3

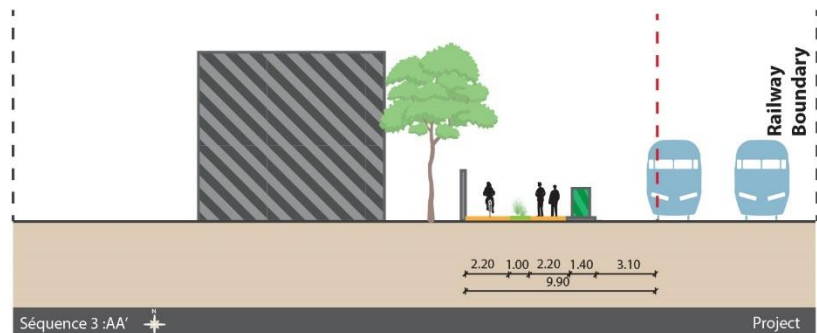
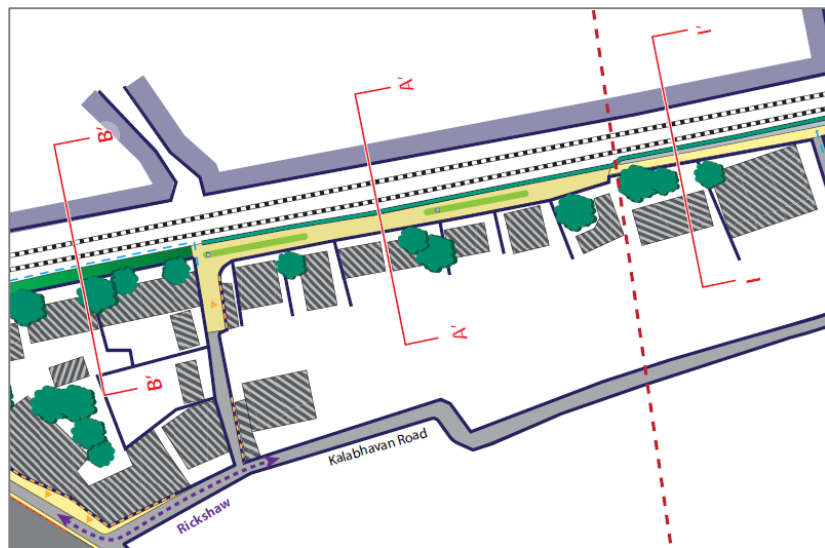


Sequence 3

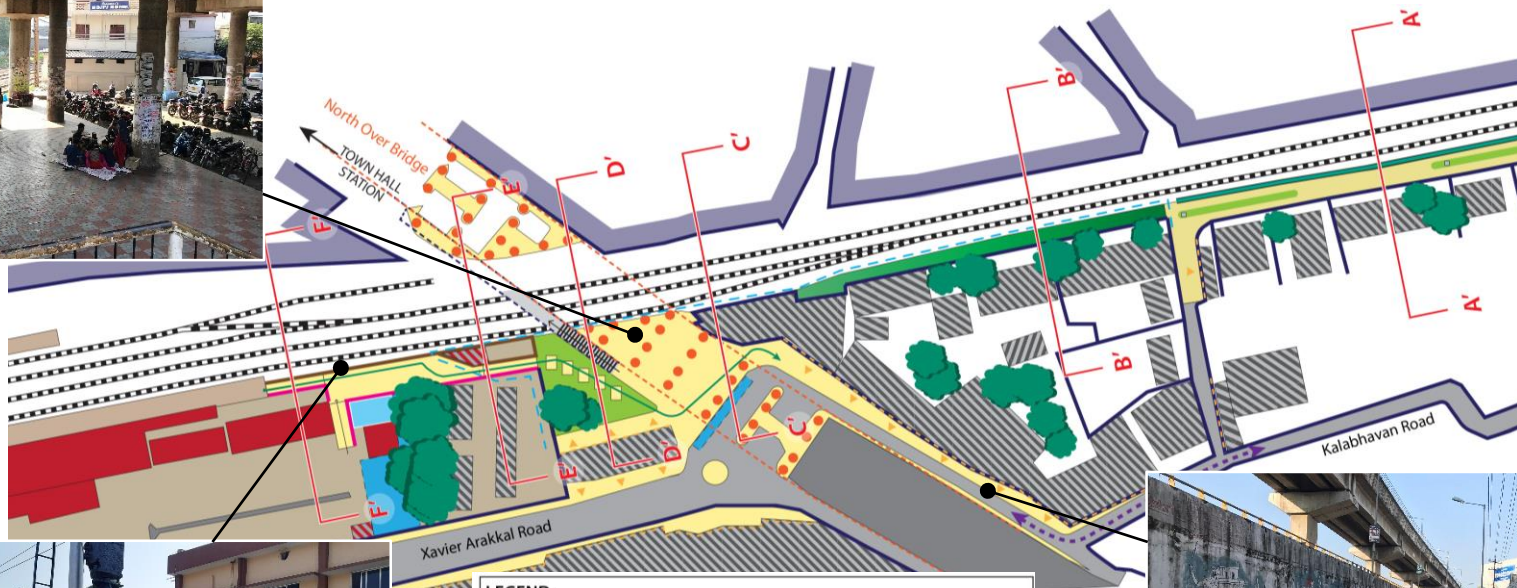


Veekshaanam Road: proposed resurfacing on about 20m



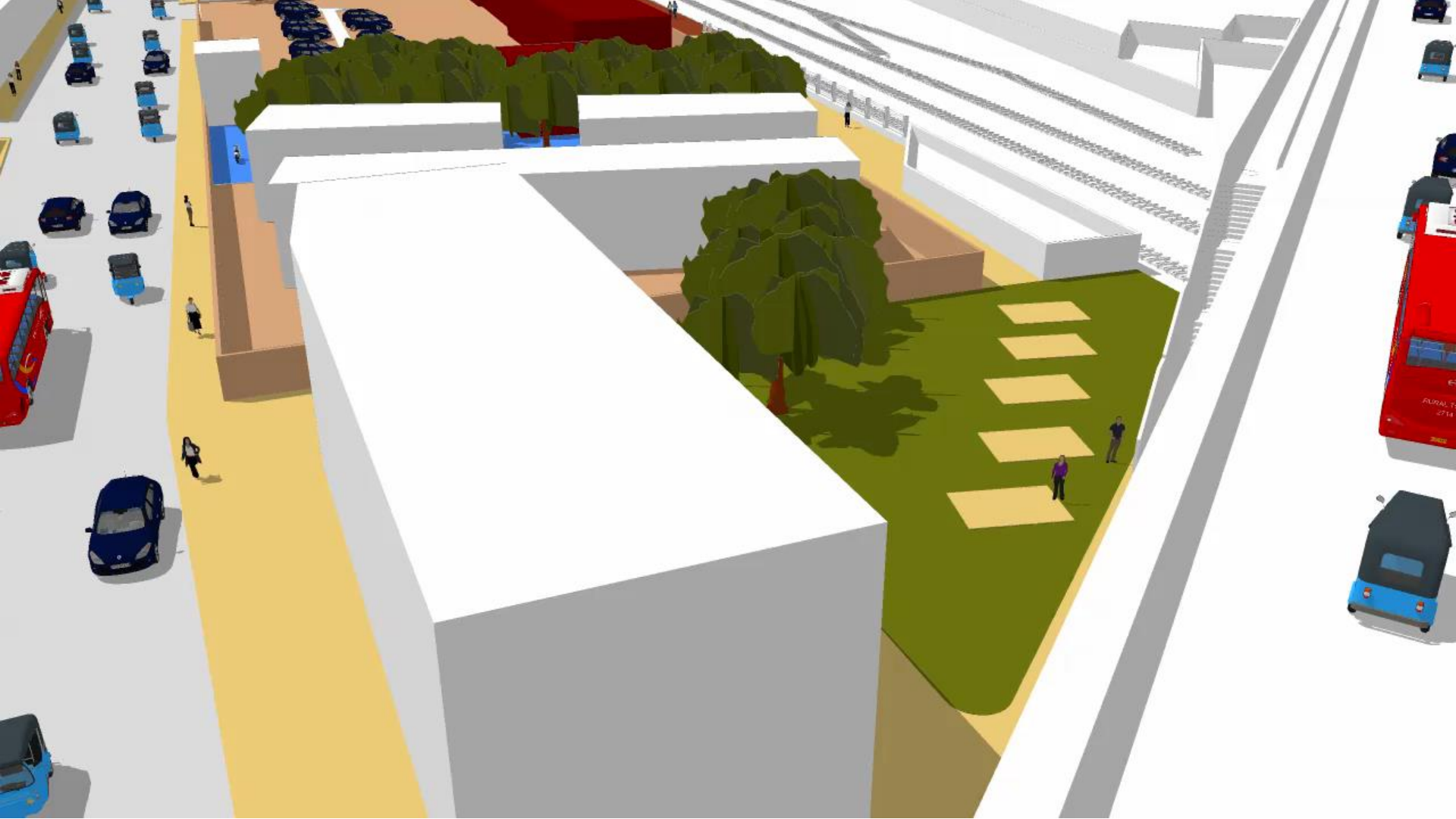


North railway station area: base option

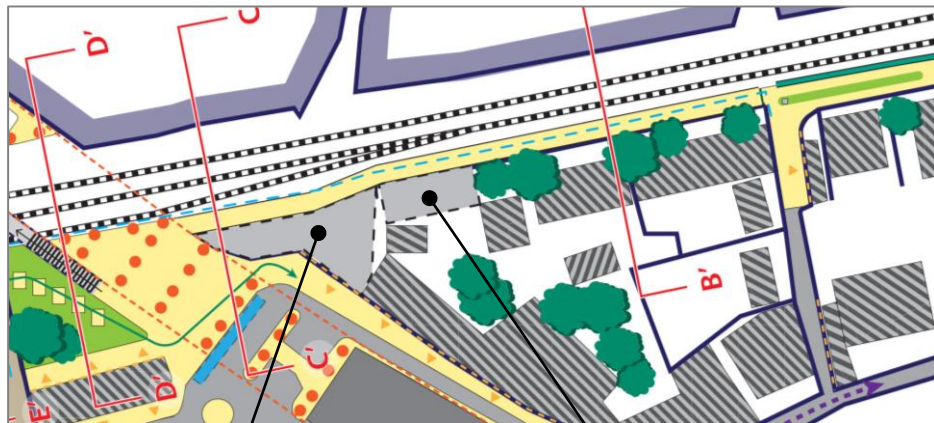


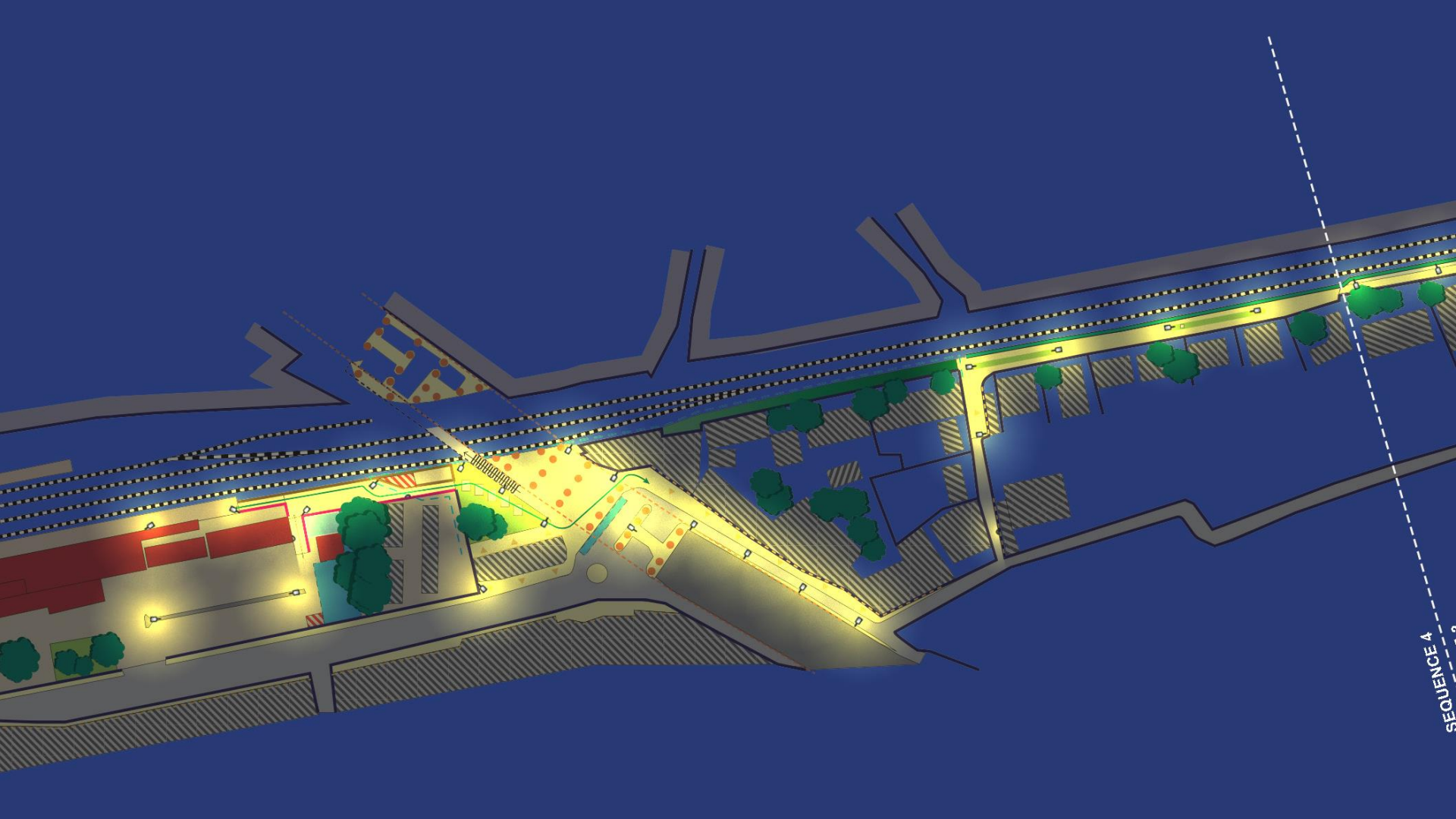
LEGEND

ROAD	BUILDING	STREETSCAPE
Pedestrian Road	Building	Partly Obstructive
Pedestrian Priority Road	Technical Building	Existing trees
Existing Paved Road	Trading stall	New trees
New Paved Road	Renovated Building	Green spaces
Bus Garage	Shops	Hedges
Asphalt Road	Access to shops	Covered Drain
Dirt Road	Wall	Wooden Fence
Rickshaw	Removed Wall	Existing Boundary
Motorised Two-wheelers	New Wall	Changed Boundary
Cycle Parking	Electric Box	
Road Over Bridge		
Pedestrian Over Bridge		



Variant

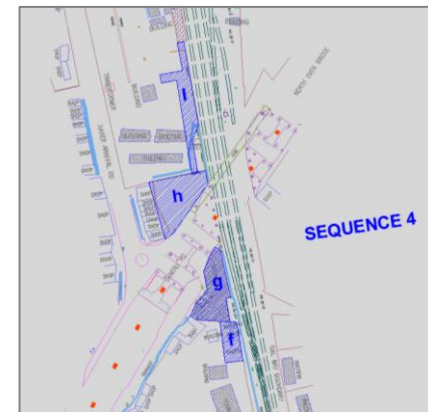
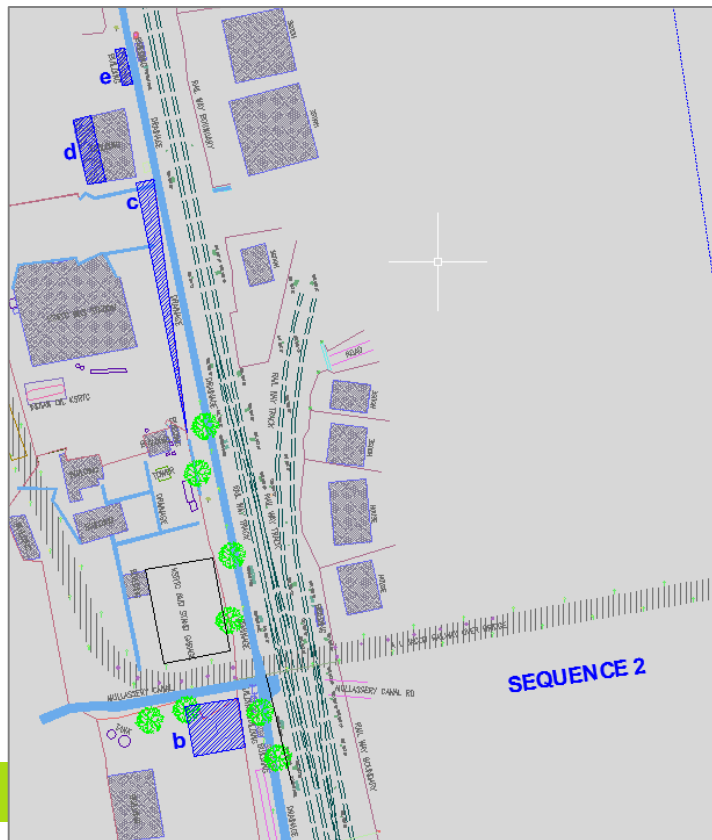




SEQUENCE 4

4. Evaluation of the Mobility Improvement Plan

Summary of land acquisition and building demolition



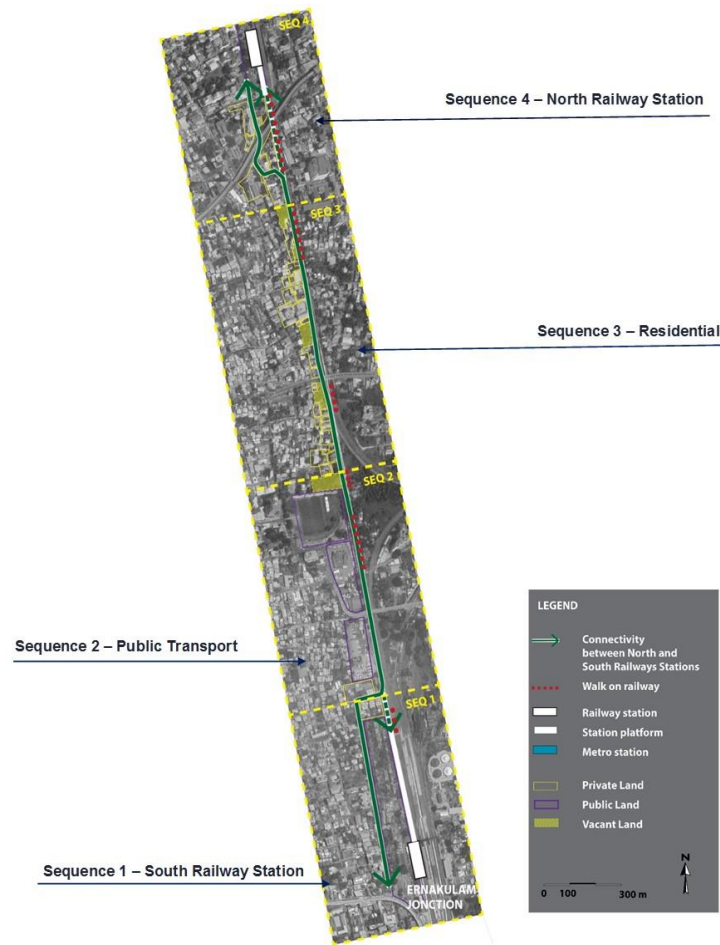
ITEM		LOCATION	OWNER	AREA (m ²)	
				Base option	Variant
a	Pathway widening	South station	Indian Railways	70	—
b	Creation of Square Mullassery Road	KRSTC Garage	KRSTC	500	—
c	Extension of paved road	KRSTC Terminal	KRSTC	450	—
d	Demolition informal buildings	Stadium	?	250	—
e	Demolition small residential building	Stadium	?	76	—
f	Demolition small residential buildings	South of the flyover	?	—	215
g	Demolition multi-storey building	South of the flyover	?	—	450
h	Creation of green space	South of the flyover	?	675	—
i	Creation of pedestrian ramp	South of the flyover	Indian Railways	430	—

Financial costing

	Length (m) Along railway line, between railway station platforms	Base option (short-term) INR Crores	Variant (long-term) INR Crores
Sequence 1	180		1.8
Sequence 2	640		13.5
Sequence 3	840		5.2
Sequence 4	390	3.4	4.6
Total	2,050	24	25

- Preliminary costing, order of magnitude
- Land acquisitions not included
- Maintenance cost highly dependent on the maintenance policy. Reference annual cost would be 3% of the investment cost, or INR 0.7 Crore/year.

Investment about INR 25 Crores



Frequmentation

4 categories of users:

- **Present NMT users of the corridor**, who would continue to use it but with much improved conditions.
- **Autorickshaw users** travelling on the roads close and parallel to the railway corridor (CP Ummer Road, Khalabhavan Road etc.) for trips limited to the area between the two railway stations. Once the Green Mobility corridor is constructed, a part of them would transfer to walking, cycling or using e-rickshaws.
- **Private vehicles** (motorised two-wheelers, private cars) or **cab** (Ola, Uber) **users** travelling within the corridor. A part of them would also transfer to walking, cycling or e-rickshaws.
- People who are presently not travelling on the corridor, due to the bad conditions, but who would use it when it is constructed: “**induced demand**”. Assumed level is 25% but it can be much more if the project is highly successful in attracting new activities and developing social life.

Present mode	No transfer	Intention to transfer to...			Total transferred
		Walking	Cycle	E-rickshaw	
Autorickshaw	47%	25%	2%	26%	53%
Motorcycle	53%	31%	4%	12%	47%
Car / Cab	63%	30%	0%	7%	37%

Present mode	Current daily passengers	Transferred to Green Mobility corridor			
		Walking	Cycle	E-rickshaw	Total
Walking	6 010	6 010	-	-	6 010
Cycle	380	-	380	-	380
Autorickshaw	3 160	790	60	820	1 670
Motorcycle	810	250	30	100	380
Car / Cab	860	260	0	60	320
Induced trips	-	1 830	120	250	2 200
Total	11 220	9 140	590	1 230	10 960

***Daily frequentation and usage of green modes
estimated at 11,000***

***20,000 people living within 500m of the corridor, about
30,000 including people having daily activities***

Decongestion and GHG/pollutants impacts

2,840 veh.-km transferred daily to green modes

84 tonnes of CO₂ emissions saved every year

Present mode	Passenger reduction	Occupancy rate	Vehicle reduction	Average distance	Veh.-km reduction
Autorickshaw	1 670	2.45	680	2.625	1 790
Motorcycle	380	1.49	260	2.625	680
Car / Cab	320	2.35	140	2.625	370
Total	2 370		1 080		2 840

	g/km					mg/km					
	CO	HC	NOx	CO2	PM	Benzene	1-3Butadiene	Formaldehyde	Acetaldehyde	Total Aldehyde	Total PAH
Autorickshaw	0.804	0.696	0.286	100.218	0.094	0.008	0.011	0.006	0.005	0.014	0.640
Motorcycle	0.587	0.424	0.123	45.600	0.011	0.001	0.001	0.005	0.004	0.009	0.375
Car / Cab	1.112	0.153	0.208	142.684	0.006	0.001	0.005	0.014	0.001	0.042	0.092

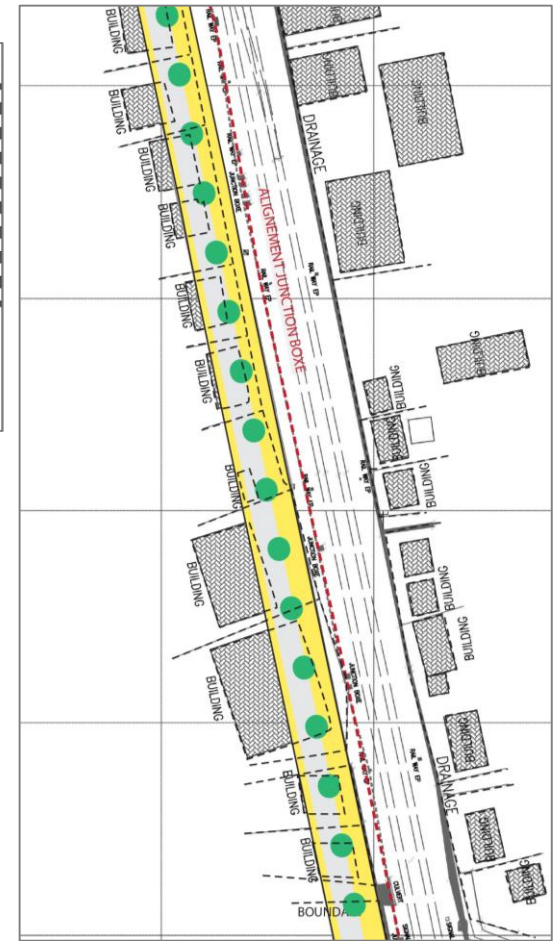
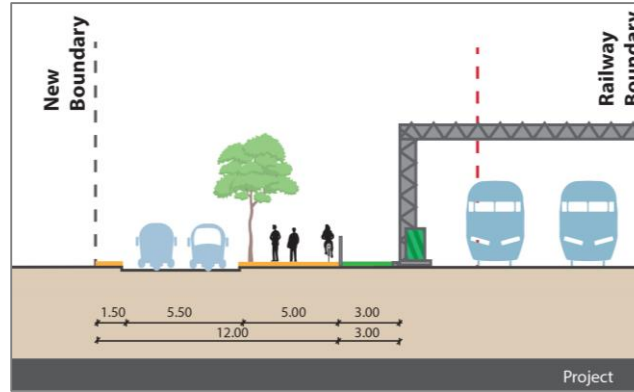
	g/day					mg/day					
	CO	HC	NOx	CO2	PM	Benzene	1-3Butadiene	Formaldehyde	Acetaldehyde	Total Aldehyde	Total PAH
Autorickshaw	1 439	1 246	512	179 390	169	14	20	11	8	24	1 145
Motorcycle	399	288	83	31 008	8	1	1	3	3	6	255
Car / Cab	412	57	77	52 793	2	0	2	5	0	15	34
Total	2 250	1 590	672	263 191	178	15	22	19	12	46	1 434

	kg/year					g/year					
	CO	HC	NOx	CO2	PM	Benzene	1-3Butadiene	Formaldehyde	Acetaldehyde	Total Aldehyde	Total PAH
Autorickshaw	461	399	164	57 405	54	4	6	4	3	8	367
Motorcycle	128	92	27	9 923	2	0	0	1	1	2	82
Car / Cab	132	18	25	16 894	1	0	1	2	0	5	11
Total	720	509	215	84 221	57	5	7	6	4	15	459

5. Long-term vision

Long-term vision

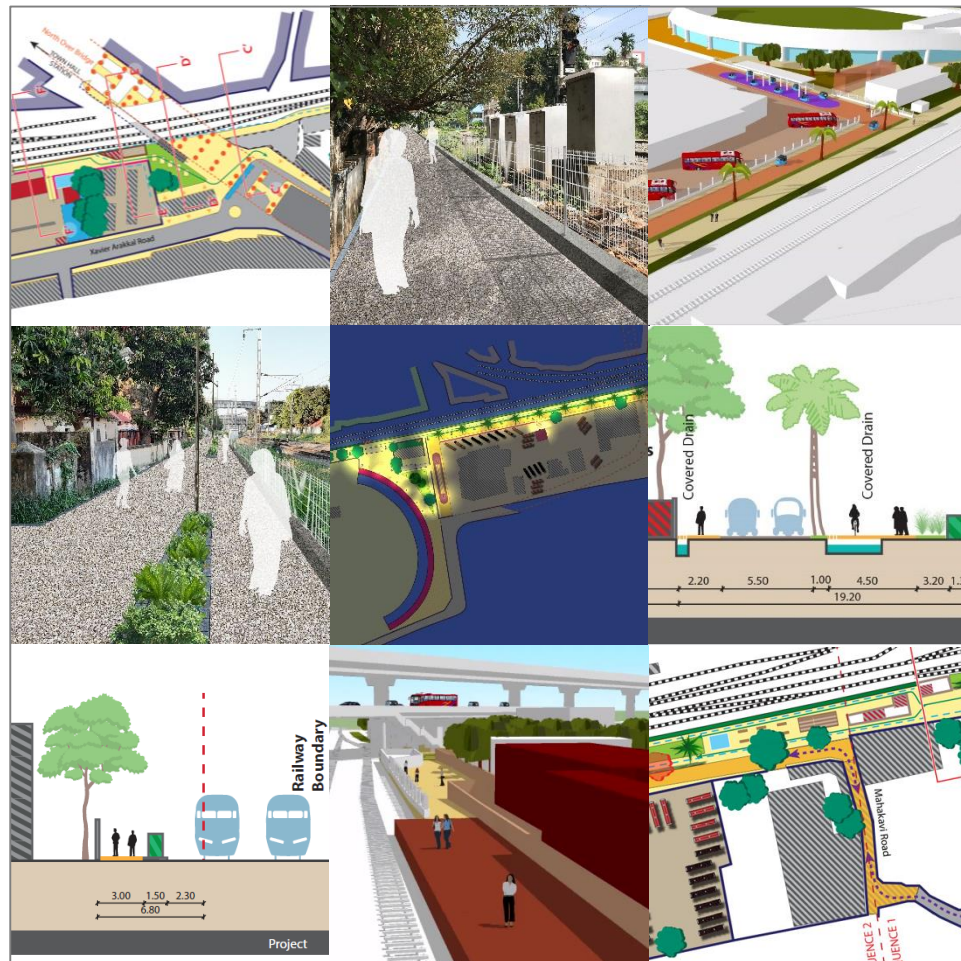
- Continuous 12m-wide street
- Possibility of including e-rickshaws and local traffic of light vehicles
- Major impacts on land, buildings, trees and structures
- About 35 private properties to be acquired (approx. 7 acres), more than 25 with demolition of residential buildings
- Draft estimate of construction cost, excluding land acquisition and impacts on the main structures: INR 40 Lakhs



6. Conclusion

Conclusion

- This study **confirms the feasibility of a Green Mobility corridor** joining the two main railway stations in Kochi.
- **The project could be implemented at short term**, with limited land acquisition. It could also easily be constructed by stages.
- It would bring **comfort, safety and security to the numerous existing users of the corridor**, and will attract new ones, including people transferring from less environmental-friendly modes to non-motorised transportation and e-rickshaws.
- It would also considerably **improve the urban quality and landscape** of the corridor and would help **develop new social and economic activities**. The area would be better included in the city and better connected to the city centre.





Thank You